

REMARKS

By the foregoing amendment, claims 1 and 2 have been combined and the glass frit composition further specified as that taught on page 22. Two new claims based on page 14, line 3 from the bottom, have been presented for consideration, and claim 19 has been made dependent on one of these new claims

The claims of this application are directed to an electrically conductive paste which can be used for forming wiring conductors and can be co-fired with the green multilayer ceramic substrate composed of a plurality of unfired laminated ceramic layers with the paste disposed in the ceramic layers, and the resulting substrate. The electrically conductive paste contains three components, namely (1) a metal powder which has an oxide of Al, Si, Zr, Ni, Ti, Nb, Mn and/or Mg which is not sintered at a sintering temperature of the green ceramic layers on its surfaces, (2) a glass frit which has a softening point 150°C to 300°C lower than the sintering temperature, and (3) an organic vehicle. A feature of the frit is that its softening point is 650°C to 850°C. and it contains 44 to 55 percent by weight of SiO₂, 10 to 20 percent by weight of B₂O₃ and 20 to 30 percent by weight of one or both of BaO and SrO. The invention is not taught or suggested by the references cited.

The rejection of claims 1, 3-7, 9, 15-16 and 19-20 under 35 U.S.C. § 103 over Fukuoka in view of Siuta or over Yoshihara in view of Siuta are moot in light of the foregoing amendment.

The rejection of claims 2 (now incorporated into claim 1), 10-12, 14 and 17-20 under 35 U.S.C. § 103 over Fukuoka in view of Siuta and Hayakawa is respectfully traversed.

One of the features of the present invention is that the glass frit has a softening point is 650°C to 850°C. and that it contains 40 to 55 percent by weight of SiO₂, 10 to 20 percent by weight of B₂O₃ and 20 to 30 percent by weight of one or both of BaO and SrO. The working examples in the present application show the effect of glasses not complying with these parameters. The Office Action acknowledges that neither Fukuoka nor Siuta teach or suggest a glass having a softening point is 650°C to 850°C. In fact, Fukuoka's glass not only has a softening point of 300°C to 600°C., and Siuta was cited only for its teaching of a metal oxide-coated copper powder.

Beyond these deficiencies, it should be noted that Fukuoka emphasizes that the glass is a low softening point glass and also fails to teach a glass containing either BaO or SrO.

Hayakawa has been cited to show a paste containing a glass whose softening point is in the range of 530 to 650°C. That softening point is preferably in the range of 550-620°C. While the Office Action avers that it would be obvious to substitute a glass having a softening point of 650°C. for the Fukuoka glass, that contention overlooks the fact that the Hayakawa 530-650°C softening point glass was specifically designed for use in a terminal electrode paste while Fukuoka's 300 to 600°C softening point glass was specifically designed for use in an internal electrode paste and the selection of a glass having such a low softening point has been emphasized for such use. Clearly, if one was going to substitute of Hayakawa glass for the glass in Fukuoka's internal electrode paste, a glass having a softening point of 530-600°C. would be selected and a glass having a softening point above 600°C. would be avoided.

The Fukuoka and Hayakawa glasses are compositionally different. Fukuoka's glass does not contain either BaO or SrO, while Hayakawa's contains not less than 30% of a combination of BaO and SrO because any lower content gives a very poor acid resistance [0013]. Further, Hayakawa teaches glasses only containing up to 22 weight percent SiO₂ in Table 1, while the instant claims call for a glass containing 40-55 weight percent. Even if one would choose a Hayakawa glass having precisely a softening point of 650°C and precisely 30% BaO plus SrO, and there is no apparent reason to do so, that glass would not be the glass recited in the present claims.

Both the Fukuoka and Hayakawa pastes are designed to be used with a preformed substrate whereas the inventive paste is designed for cofiring with a green (unsintered) laminate. In the co-firing process of the present invention, liquid phase sintering starts when the glass is softened and the inorganic component on the metal particle surface is removed. This is achieved by the appropriate selection of the glass and coated metal particle. The combination of references do not teach any reason to make the appropriate selections or realize a paste capable of cofiring with a green laminate.

In light of all of the foregoing, withdrawal of all rejections is respectfully solicited.

Acknowledgement of the IDS of September 12, 2008 is respectfully requested.

In view of the above amendment and remarks, applicants believe the pending

application is in condition for allowance.

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Respectfully submitted,

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